



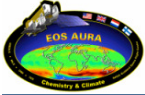
TES Usage of Meteorological Products – Update

Greg Osterman, Brendan Fisher, Bob Herman, Kevin Bowman
Jet Propulsion Laboratory
California Institute of Technology

Mark Shephard
Atmospheric and Environmental Research (AER), Inc.

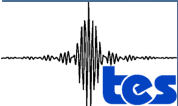
Meteorological Products Working Group Meeting
October 1, 2007





TES Version 3 Data

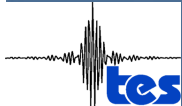
- **V003 is the current version of TES data**
- Currently reprocessing data prior to 2007 (estimated completion November 2007)
- Uses subsetting GEOS-5.0.1 products (Sep 20, 2004 – Nov 30, 2007)
- December 1, 2007: begin forward stream with GEOS-5.1.0
- Instantaneous files on pressure levels
- Use GEOS-5.0.1 temperature and water profiles as the initial guess for our L2 retrievals
- Use GEOS-5.0.1 skin temperature and surface pressure in our retrievals
- Provide GMAO tropopause pressure in our L2 products





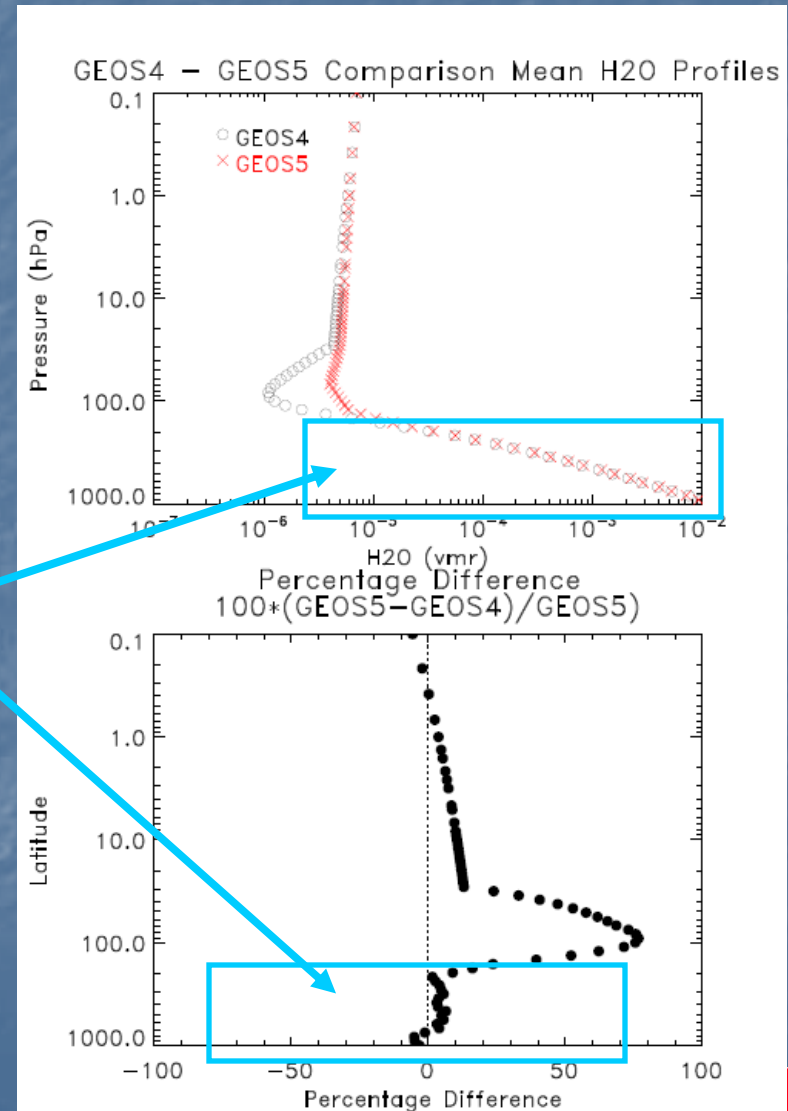
Other TES Data Versions

- Version 2 (V002)
 - Complete for all data taken between Sep 20, 2004 – Dec 31, 2006
 - GEOS-4 First Look products ("mis")
 - Instantaneous files on pressure levels
 - Use GEOS-4 temperature and water profiles as the initial guess for our L2 retrievals
 - Use GEOS-4 skin temperature and surface pressure in our retrievals
- **Version 4**
 - Still working schedule (Spring 2008)
 - Same usage of GEOS products
 - Complete processing of TES data record with GEOS-5.1.0



Difference between GEOS-4 & GEOS-5.0.1 H₂O Profiles

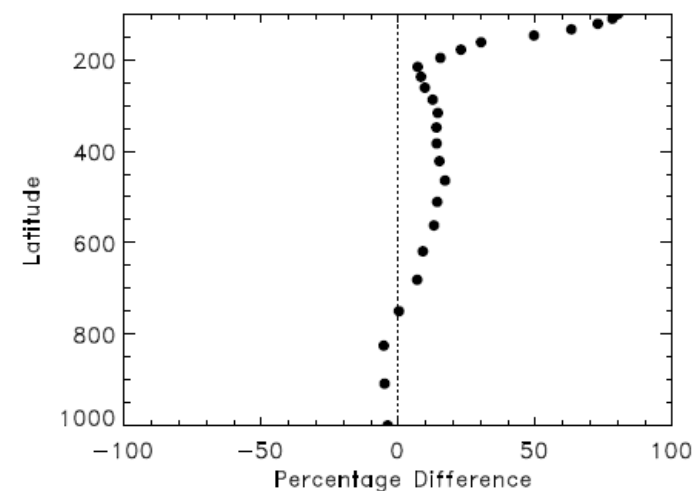
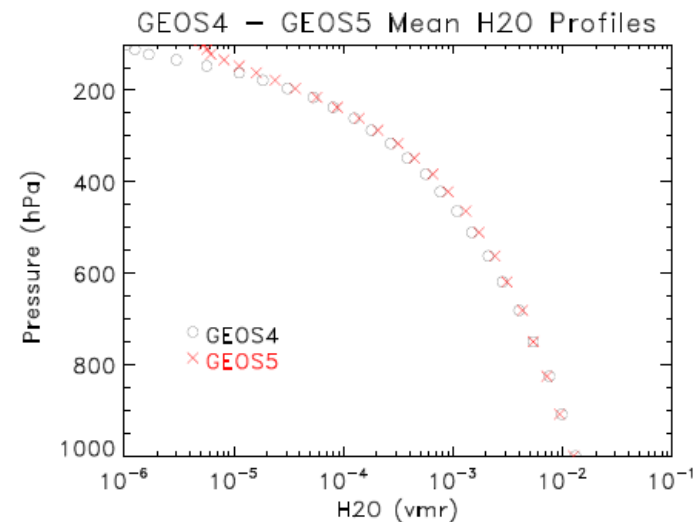
- Mean global profiles from 12 TES Global Surveys
- Compare the TES initial guess profiles (in L2 product)
- TES is primarily sensitive ~200 hPa and below





Difference between GEOS-4 & GEOS-5.0.1 H₂O Profiles

- Mean global profiles from one TES Global Survey
- Compare the TES initial guess profiles (in L2 product)
- TES is primarily sensitive ~200 hPa and below

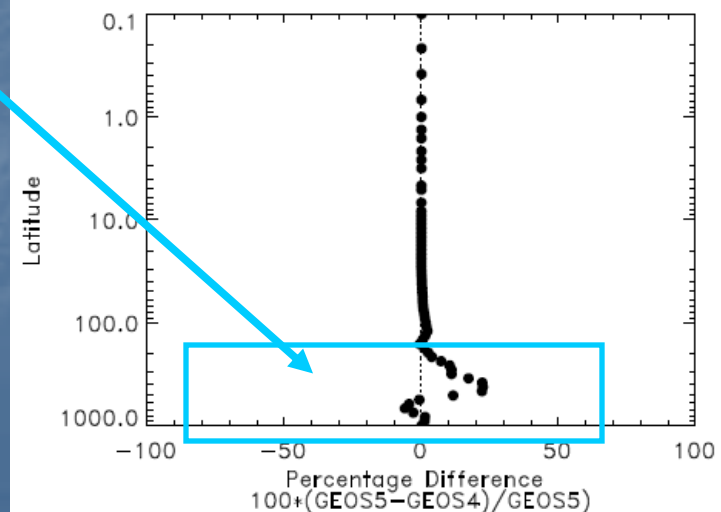
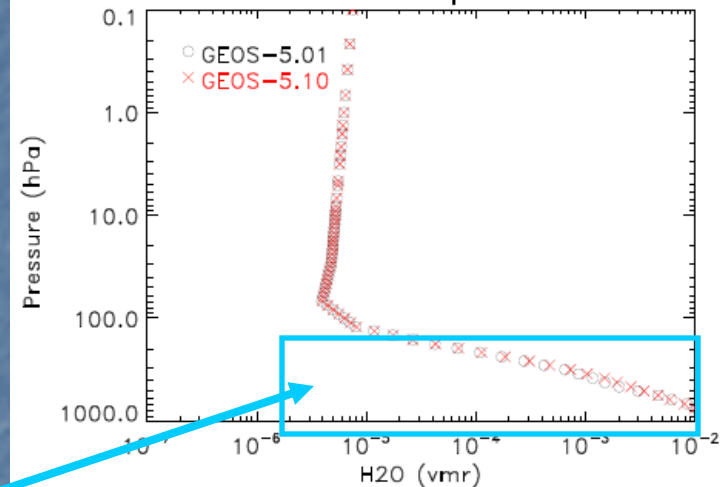




Difference between GEOS-5.0.1 & GEOS-5.1.0 H₂O Profiles

- Mean global profiles from one TES special observation (~160 profiles)
- Compare the TES initial guess profiles (in L2 product)
- TES is primarily sensitive ~200 hPa and below

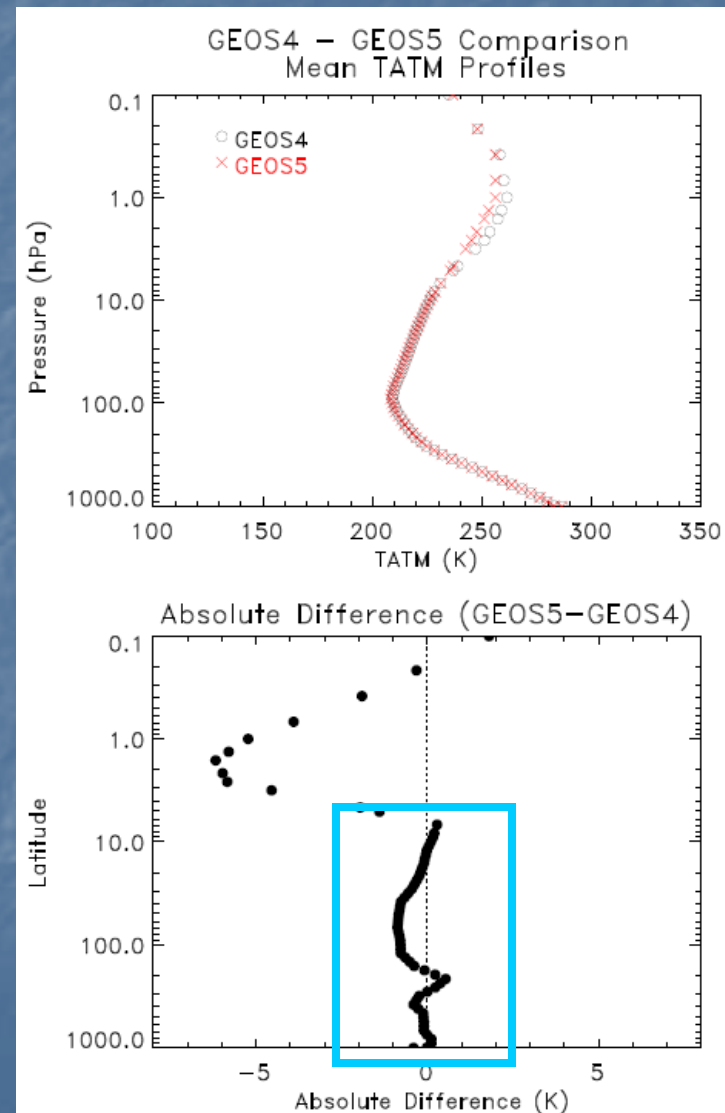
GEOS-5.01 & GEOS-5.10 Comparison Mean H₂O Pro





Difference between GEOS-4 & GEOS-5.0.1 Temperature Profiles

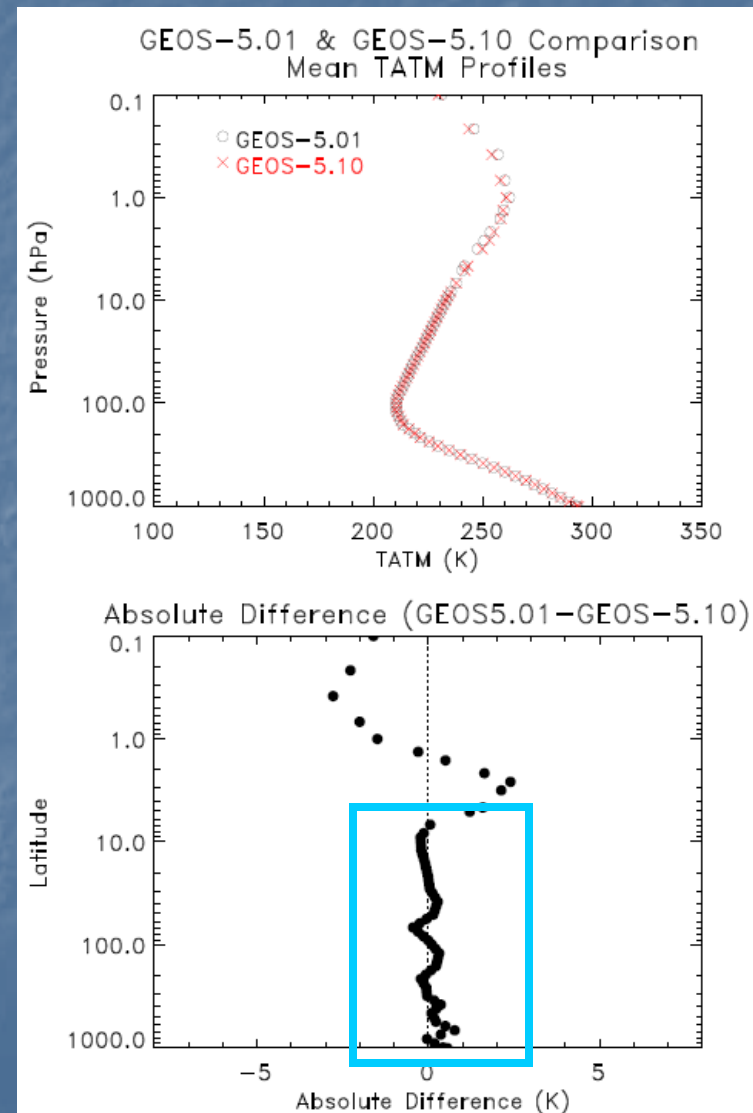
- Mean global profiles from 12 TES Global Surveys
- Compare the TES initial guess profiles (in L2 product)
- TES retrievals of temperature show sensitivity up to ~10 hPa





Difference between GEOS-5.0.1 & GEOS-5.1.0 Temperature Profiles

- Mean global profiles from one TES special observation (~160 profiles)
- Some differences in stratosphere
- TES retrievals of temperature show sensitivity up to ~10 hPa





Radiosonde Comparisons

■ Temperature

- Match-up criteria
 - 2 hours and 250 km
 - Day and night
 - NCEP Vaisala RS90 and RS92

■ Water Vapor

- Match-up criteria
 - 3 hours and 100 km
 - Nighttime only (more accurate radiosonde water vapor measurements)
 - NCEP Vaisala RS90 and RS92
 - Since these match-ups were also used for TES retrieval comparisons they had the extra screening of:
 - Retrieved cloud effective optical depths < 1.0
 - TES master quality flag

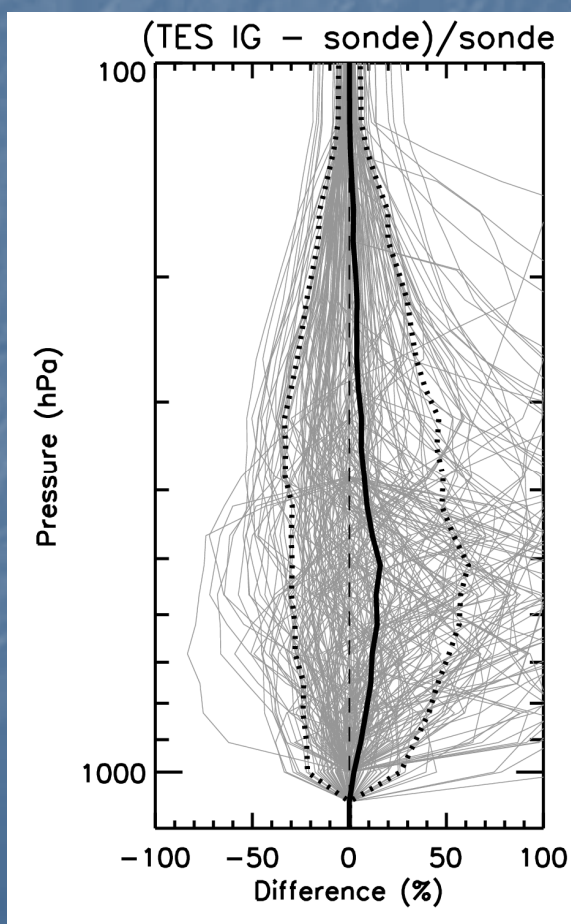




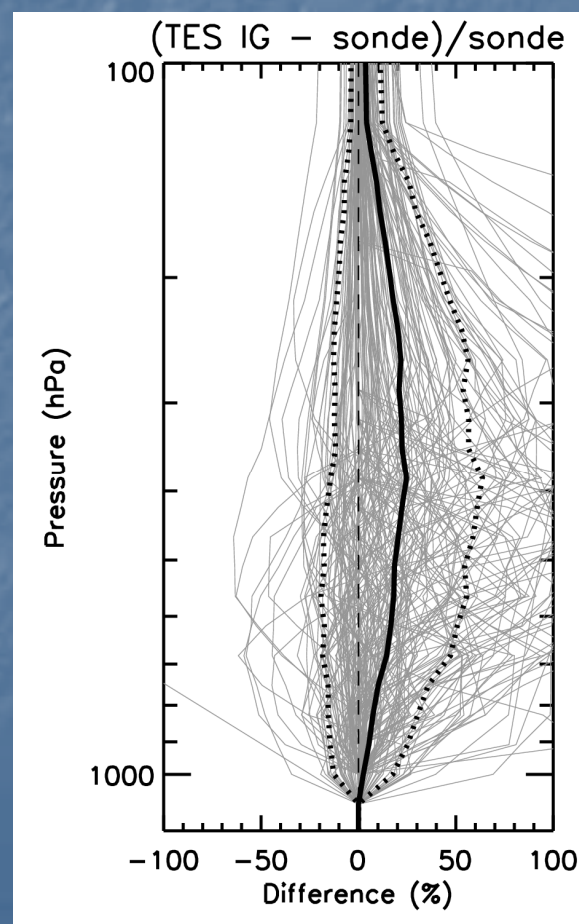
GMAO/Radiosonde Water Vapor Comparisons

M Shephard et al., Submitted JGR, 2007

GEOS-4



GEOS-5

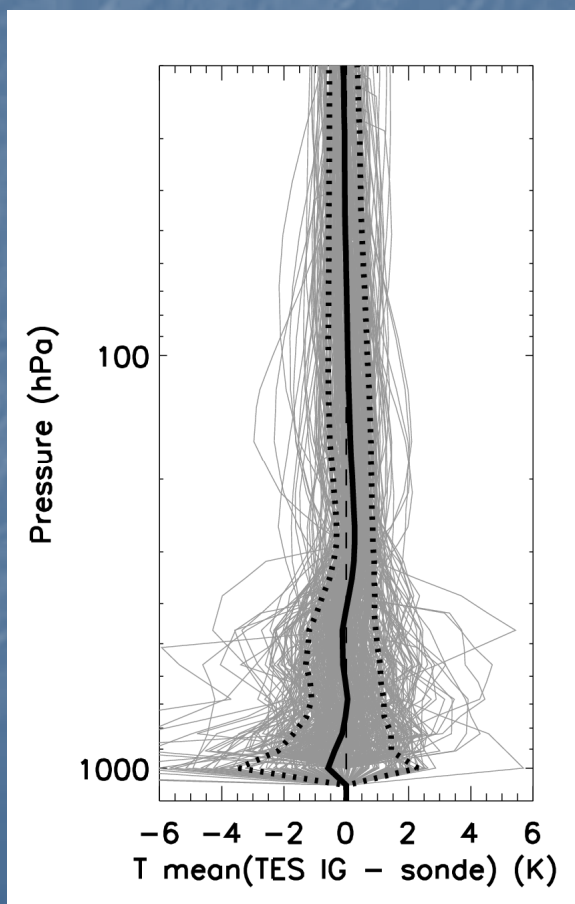




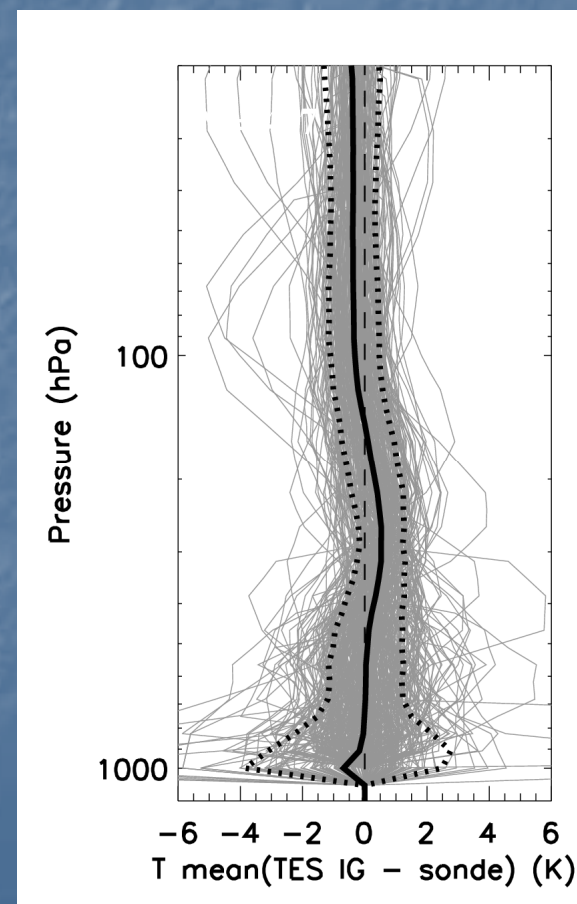
GMAO/Radiosonde Temperature Comparisons

R. Herman et al., Submitted JGR, 2007

GEOS-4



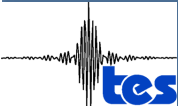
GEOS-5





Future Developments with GMAO

- Increased scientific relationship with GMAO is critical for the full exploitation of TES data.
- Assimilation of TES data into GMAO
- TES team is actively involved in a multi-institutional effort to develop the adjoint of GEOS-Chem
- This effort needs the discrete adjoint of the GEOS-4 advection
- Ricardo Todling at GMAO has started to help with this effort
- We will need the discrete adjoint as GEOS-5 evolves.
- Error estimates for the GEOS-5 products



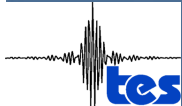
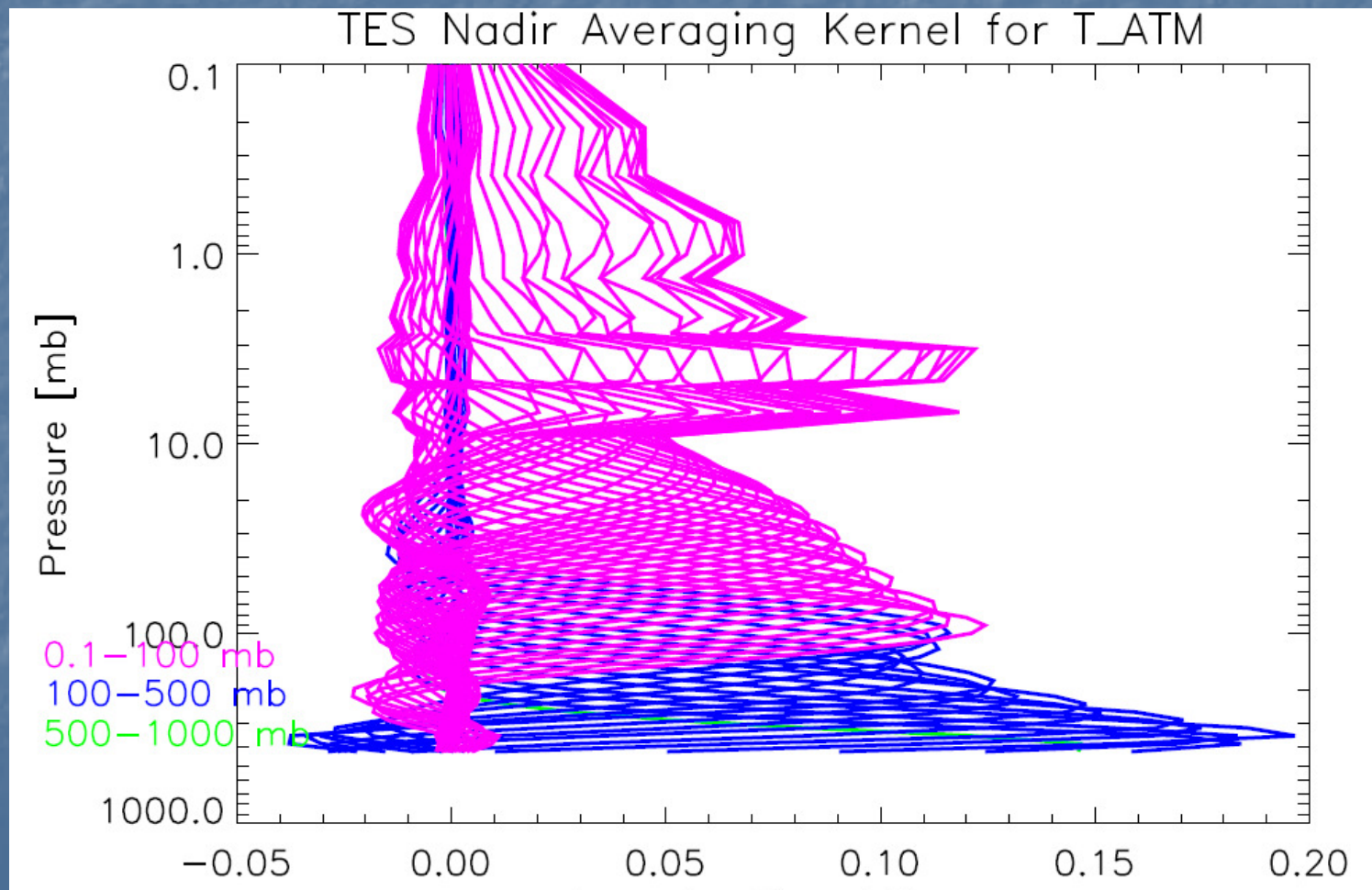


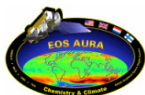
Extra





TES Temperature Averaging Kernel





TES Water Averaging Kernel

TES Step & Stare Nadir Averaging Kernel Diagnostics: H₂O

Cross Section Along Orbit Track: RunID=5747, Seq=1-1, Scan=0-164, UTCtime=19:46:45-20:05:04

min = -0.0157214, max = 0.627675

